

Original Communication

Suicidal hanging: Fatalities in Istanbul Retrospective analysis of 761 autopsy cases

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Abstract

We retrospectively analyzed the autopsy records of the Institute of Forensic Medicine during the five-year period between 1998 and 2002 to document the characteristics of fatalities resulting from hanging which is the commonest mode of suicide in Istanbul. Upon analysis of death scene investigation and autopsy reports together with the information gathered from the police, the cases of hanging fatalities of suicidal origin were selected. Seven hundred sixty one hanging cases of suicidal origin were detected and evaluated in terms of demographic features, the type of hanging material used for ligature, cause of death, internal findings in neck organs, other traumatic findings suggesting the use of another method for suicide, toxicological findings and microscopic findings in delayed death cases.

In 364 of these cases suspension was complete and in 397 incomplete. Five hundred thirty seven of those (70.56%) were male and 224 (29.44%) were female. The preponderance of male cases in our autopsy population was also detected in suicidal hanging cases. There was no case aged lower 10 and the number of the cases in the age group of cases aged over 80 was the lowest ($n = 3, 0.4\%$). In 634 of cases, the place of hanging was the subject's own house, most victims selected rope (652 cases) for the ligature with the rest using sheet, belt, cable and necktie. There were traumatic findings showing attempts of suicide other than hanging in 24 cases (tentative marks in 22 cases and non-fatal burning in 2). In 23 of cases, there were bruises of different ages. In these cases females constituted the majority suggesting violence against women that is a social problem in various cultural subgroups of our country. This violence may have played a role in the decision of suicide. Superficial bruises were detected in 56 cases and were attributed to the trauma.

Fractures in neck organs were detected in 446 of cases. In fracture-determined cases, fracture in hyoid bone was seen in 177, in thyroid cartilage in 163, in both hyoid and thyroid in 106. Vertebral fracture was detected in six cases and fractures both in hyoid, thyroid and vertebra was found in four cases. Hyperemic lines around the ligature were prominent in 620 of the cases and soft tissue ecchymoses in all cases. In 305 of the cases (40.07%) diagnosis was based only on the soft tissue hemorrhage.

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1. Introduction

Hanging is a form of ligature strangulation in which the force affecting the neck region is resulting from the gravitational drag of the weight of the body or part of the body.^{1,2} The mode of death in hanging cases is almost always suicide or accident but, homicidal cases are also encountered in forensic autopsies though rarely.³

It is reported to be an increasingly common way of attempting suicide in many countries. It is estimated that globally in 2000, 815000 people killed themselves; making the suicide the 13th leading cause of death.⁴ Hanging is the leading method of committing suicide in Istanbul, the largest city of the Turkey with a population of 15 million in 2000.⁵

In autopsies of strangulation cases including hanging, the important aspect of the post-mortem examination is the careful analysis of neck organs. These internal cervical findings (bruises in soft tissue, fracture in hyoid bone and/

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Table 1
Distribution of the cases according to age groups and gender

	10–19 years	20–29 years	30–39 years	40–49 years	50–59 years	60–69 years	70–79 years	>80 years	Total	%
Male	48	141	128	107	60	23	28	2	537	70.56
Female	39	85	27	30	19	14	9	1	224	29.44
Total	87	226	155	137	79	37	37	3	761	100.00

or thyroid cartilage) play a decisive role in the diagnosis of these cases.

The aim of this retrospective autopsy study was to document the characteristics of death cases resulting from hanging which is the commonest mode of suicide in Istanbul.

2. Material and method

The study design is a retrospective study based on the autopsy records of the Institute of Forensic Medicine that is responsible for the post-mortem examination of all forensic deaths in Istanbul. Because of the fact that almost all hanging-related fatalities are sent to the Institute for autopsy, autopsy records of the Institute at the same time reflects the current status of this type of deaths in Istanbul.

We retrospectively analyzed the autopsy records of the Institute during the five-year period between the years 1998 and 2002. Upon analysis of death scene investigation and autopsy reports together with the information gathered from the police, the cases of hanging fatalities of suicidal origin were selected. Cases with little or deficient information about the manner of death were excluded. The remainder 761 hanging cases of suicidal origin were evaluated in terms of demographic features, the type of hanging, material used for ligature, cause of death, internal findings in neck organs, other traumatic findings suggesting the use of another method for suicide, toxicological findings and microscopic findings in delayed death cases.

3. Results

Between 1998 and 2002, there were 761 cases of suicidal hanging. In 364 of these cases suspension was complete and in 397 incomplete. Five hundred thirty seven of those (70.56%) were male and 224 (29.44%) were female. The preponderance of male cases in our autopsy population was also detected in suicidal hanging cases. There was no case aged lower 10 and the number of the cases in the age group of cases aged over 80 was the lowest ($n = 3, 0.4\%$). The youngest case was 10 years old and the oldest one was 83. Most cases were in the age group of 20–29 years (226 cases, 25.69%). Table 1 shows the distribution of the cases according to age and gender. The distribution of the cases according to seasons and years is shown in Tables 2 and 3.

In 634 of cases, the place of hanging was the subject's own house. The places in which suicide has been committed are shown in Table 4.

Most victims selected rope (652 cases) for the ligature with the rest using sheet, belt, cable and necktie (Table 5).

Interestingly, there were traumatic findings showing attempts of suicide other than hanging in 24 cases (tentative marks in 22 cases and non-fatal burning in 2). In 23 of cases, there were bruises of different ages. In these cases females constituted the majority suggesting violence against women that is a social problem in various subcultures of our country. This violence may have played a role in the decision of suicide. Superficial bruises were detected in 56 cases and were attributed to result from the trauma during the agonal period.

Fractures in neck organs were detected in 446 of cases. In fracture-determined cases, fracture in hyoid bone was seen in 177, in thyroid cartilage in 163, in both hyoid and thyroid in 106. Vertebral fracture was detected in six cases and fractures both in hyoid, thyroid and vertebra were found in four cases. Hyperemic lines around the ligature were prominent in 620 of the cases and soft tissue ecchymoses in all cases (Fig. 1). No tears of intimae of the carotid artery were seen and no seasonal pattern was identified.

In toxicological analysis, alcohol was detected in 91 cases. The highest level was 421 mg/dl in a chronic alcoholic case and the lowest level was 30 mg/dl. In the death of a chronic alcoholic in which the blood alcohol level was 421 mg/dl, the origin of the hanging was investigated thoroughly. The findings of death scene investigation together with internal findings obtained at autopsy revealed the origin of hanging being suicide.

Table 2
The distribution of the cases according to years

Years	Number	%
1998	141	18.53
1999	132	17.33
2000	156	20.50
2001	182	23.92
2002	150	19.72
Total	761	100.00

Table 3
The distribution of the cases according to seasons

Months	Number	%
December–February	221	29.04
March–May	211	27.72
June–August	179	23.52
September–November	150	19.72
Total	761	100.00

Table 4
The distribution of the cases according to place of suicide

Place of suicide	Number	%
House	634	83.31
Workplace	39	5.13
Open field	28	3.68
Hotel	17	2.23
Psychiatry hospital	9	1.18
Prison	8	1.05
Barn	6	0.79
Hut	5	0.66
Barracks	5	0.66
Landing place in building	4	0.53
Custody	3	0.39
Old age asylum	1	0.13
School	1	0.13
Cage of the lorry	1	0.13
Total	761	100.00

Table 5
Distribution of the cases according to the material used for ligature

Material	Number	%
Rope	652	85.68
Sheet	36	4.73
Belt	24	3.15
Cable	21	2.76
Necktie	11	1.44
Scarf	7	0.92
Strand of blanket	3	0.40
Suitcase belt	3	0.40
Tape	2	0.26
Hose	1	0.13
Fishing line	1	0.13
Total	761	100.00

4. Discussion

The human neck is vulnerable to many types of life-threatening compression injuries like hanging due to its relatively small diameter, lack of bony support, close relation to the airway, spinal cord and major vessels. For this reason, this region was used for execution of judicial sentence and also preferred by suicide victims in many cultures.^{6,7}

There were 761 suicidal hanging fatalities in Istanbul between the years 1998 and 2002. These fatalities consti-

tuted 5.20% of all forensic autopsies carried out by Institute of Forensic Medicine in that time period. The percentage of these cases was reported to be 3.0% in 1980–1983 and 3.8% in 1986–1989.^{8,9} There seems to be a marked increase in the number of suicidal hanging fatalities with increase in population of this crowded city. Hanging was shown to be second leading cause of death after intoxications in Izmir that is another large city of Turkey and it was leading method of suicide among men in Sivas that is a province in east region of the country.⁵ All data obtained from the autopsy studies carried out in different regions of the country show that hanging is a common method of suicide both in Istanbul and other provinces of the country with a percentage ranging between 3% and 5% of all forensic autopsies.

Hanging is a leading method of suicide in Germany and Japan and it is the second leading suicide method after intoxications in India.^{10–12} In US, despite the fact that the suicide patterns differ according to the states, hanging was reported to be the second leading method of suicide after firearms in general.¹³

Suicidal hanging in Istanbul is a predominantly male affair with 70.56% of cases being male and only 29.44% of those being female. The preponderance of male cases in our autopsy population was also detected in suicidal hanging cases. This figure contrasts with high incidence of hanging in woman (40%) reported in Denmark by Simonsen¹⁴ and those of London, Northern Ireland.^{15,16} The preponderance of male cases in suicidal hanging fatalities is a common feature in some of other studies like Cardiff study and in general males constitute approximately 60% of these cases.¹

Most of the victims were found to be in 20–29 age group and these cases constituted 25.69% of all cases. This age group was also reported to collect most of the cases in other similar studies.

Fractures in neck organs were detected in 456 (59.93%). A hyoid fracture was seen in 23.26%; a thyroid fracture in 21.42%; and both hyoid and thyroid fractures in 13.93% of the cases. Fracture both in hyoid and thyroid together with cervical vertebra was found only in four cases. Soft tissue hemorrhages around the neck organs were detected in all cases and hyperemic lines around the ligature mark were prominent in 620 cases. Fractures were likely to occur in the over 30 age group compared to the under 30's. The reported incidence of fractures in hanging fatalities of different studies differ markedly as seen in Table 6 (e.g., Inanici²⁴ reported it to be 30%; James¹ reported to be 36%). It ranges between 0.8% and 59% in different studies. Findings of neck organs in different autopsy series are shown in Table 6. As seen in the table there is a marked discrepancy between the findings reported by different authors and this reflects the absence of standardization in examination methods.

Although the important part of the post-mortem examination of strangulation cases is search for vital findings it is reported that detecting vital findings in strangulation cases is problematic due to the fact that fatal trauma to neck region is with very short survival period.³

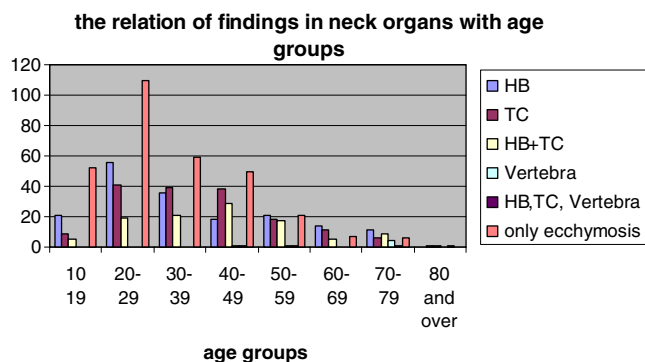


Fig. 1. Distribution of findings in neck region according to age groups. HB = hyoid bone, TC = thyroid cartilage.

Table 6

Trauma to the hyoid bone and thyroid cartilage in hanging in different series

Study	The number of cases	Fracture in neck organs (n)	%
Sen Gupta ¹⁷	101	0	0
Zavilla ¹⁸	363	3	0.8
Jonas and Greifova ¹⁹	1000	76	7.6
Doichinov and Simeonov ²⁰	375	57	15.2
Luke ²¹	28	7	25.0
James and Silcocks ¹	84	30	36.0
Dietz ²²	233	127	54.5
Polson ²³	80	44	55.0
Inanici ²⁴	50	15	30.0
Current study	761	456	59.9

Forensic pathologists commonly evaluate the neck organ complex at autopsy via visual and palpatory examination. This examination is carried out by exposing the organ complex either in situ or after removal of the trunk organ complex. However, it is reported that only the fractures of the cornua of the hyoid bone and thyroid cartilage can be detected by this way. Infarctions and fissures with slight or no displacement can be masked by soft tissue.²³ It was also reported that injuries of lamellae of the thyroid cartilage, cricoid cartilage, and trachea could not be detected only by visual and palpatory examination. Elasticity of the cornua or the effect of decomposition was also proposed factors to lead to false outcomes in palpatory examination.^{25,26} For this reasons some authors emphasize the importance of careful preparation of the hyoid bone and laryngeal cartilages in the laboratory to reveal every injury and to minimize the effects of these negative factors.^{27,28} In a study comparing the classical method and preparation method, the ratio of false diagnosis for hyoid bone was reported to be 5% and 17% for thyroid cartilage after stereoscopic analysis of prepared specimens. The ratio of fractures was reported to be 76.6% in suicidal hanging fatalities by Stereomicroscopy.²⁸ This ratio is relatively high when compared to the findings of other series. Based on these data one can conclude that important part of the injuries remain undetected during the routine visual and palpatory examination.

In forensic autopsies of these cases we also use the palpatory and visual examination method for search of fractures and the percentage of fracture-determined cases of our series is about 60%. For this reason, visual and palpatory examination method must be regarded as preliminary method and stereomicroscopic investigation of the completely prepared organocomplex must be the prime investigation process.

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